

REMARKS/ARGUMENTS

Applicants wish to thank Examiner Lundgren for indicating that Claim 35 is allowed. Applicants respectfully submit that, in view of the following remarks, all of the pending claims are fully patentable.

Present Claims 1, 2, 4-17, 20-24, 33, and 34 relate to processes for mask-free localized grafting of organic molecules, which are capable of being electrically activated, onto a composite surface comprising conductive and/or semiconductive areas that are materials of different nature, the process comprising

placing said organic molecules in contact with said composite surface; and

electrochemically grafting an insulating film of said organic molecules on chosen, defined areas of said conductive and/or semiconductive areas by bringing said chosen, defined areas to a potential higher than or equal to a threshold electrical potential, which is determined relative to a reference electrode, and above which grafting of said organic molecules takes place.

The rejection of Claims 1, 2, 4-17 and 20-24 and 34 under 35 U.S.C. § 103(a) in view of U.S. Patent No. 4,269,682 (Yano et al.) in view of U.S. Patent No. 5,350,323 (Boissel et al.) and Journal of Electroanalytical Chemistry, 1999 (Charlier et al.), as evidenced by U.S. Patent No. 5,168,321 (Gregory et al.) is respectfully traversed.

In Yano et al., the process implemented to prepare the structure presented in Figure 2 is explained at column 9, lines 48-64. Thus, the polyvinyl chloride is firstly coated on all of the surface of the structure and, in particular, on the reference electrode (20) and on gold electrode (14). Then a **mask** made of aluminum is deposited on the reference electrode (20) to protect it when the polyvinyl layer is removed from the unprotected areas and, in particular, from the gold electrode (14) by etching in oxygen plasma.

Once the unprotected polyvinyl layer removed, the aluminum layer protecting the reference electrode (20) is also removed to obtain a structure which includes a reference electrode (20) coated by a polyvinyl layer which corresponds to the hydrophobic organic membrane (25).

In this regard, it should be noted that the sentence “*Then, polyvinyl chloride is coated in a thickness of about 1000 Å on the gold electrode*” at column 9, lines 48-49, of Yano et al., cannot be interpreted as meaning that the polyvinyl chloride is only deposited on the gold electrode. Otherwise, the above explained process would result in a structure without polyvinyl chloride, since if the polyvinyl chloride was only present on the gold electrode, it would be removed by etching in oxygen plasma.

Thus, in Yano et al., *a mask is used* to obtain the measurement system represented at Figure 2.

In contrast, the present claims are directed toward *mask-free* processes for localized grafting of organic molecules on chosen defined areas. The presently claimed methods aim to solve this technical problem *in one step* by adjusting the electrical potential to the chosen defined areas onto which organic molecules are thus electrografted (see, paragraphs [0029] to [0032] of the published version of the present application, U.S. 2004/0082120).

Even if the structure of Figure 2 of Yano et al. can be considered to be obtained from a composite surface gold/silicon nitride ( $\text{Si}_3\text{N}_4$ ), this structure does not correspond to a structure obtained from the presently claimed processes.

Indeed, there is no difference between the  $\text{Si}_3\text{N}_4$  area onto which the hydrophobic organic membrane (25) is deposited and the  $\text{Si}_3\text{N}_4$  area surrounding this 1<sup>st</sup> area. These different areas of  $\text{Si}_3\text{N}_4$  *are not* materials of different nature.

In addition, and as explained in the reply to the preceding Office Action, the electrografting disclosed in Charlier et al. *cannot* be implemented on  $\text{Si}_3\text{N}_4$ .

For electrografting to be implemented, the surface onto which the organic molecules are to be electrografted must be adjusted to an electrical potential. Electrografting involves a “current” and thus *very weak resistance*. In other words, electrografting can only be implemented on surfaces presenting a very weak resistance.

To prepare the structure of Figure 2 of Yano et al., the electrografting would be implemented on  $\text{Si}_3\text{N}_4$ .  $\text{Si}_3\text{N}_4$ , however, is a *very resistive material*. In support of this assertion, please find hereinafter the average resistivity of the materials implemented in the present invention and in Yano et al. (resistivity at 25°C):

- Gold :  $22 \times 10^{-9}$  ohms·meters;
- Silicon (non doped) : around 600 ohms·meters;
- $\text{SiO}_2$  : around  $1 \times 10^{13}$  ohms·meters; and
- $\text{Si}_3\text{N}_4$  : around  $1 \times 10^{12}$  ohms·meters.

For these reasons, electrografting cannot be used to prepare the hydrophobic organic membrane (25) on  $\text{Si}_3\text{N}_4$  in order to obtain the structure disclosed in Yano et al.

As a consequence, one of ordinary skill in the art which is an electrochemist would not have had any expectation of success at arriving at the presently claimed methods by combining Yano et al. with the electrografting disclosed in Charlier et al. Accordingly, even the combined teachings of Yano et al. and Charlier et al. cannot make the present claims obvious.

Applicants further submit that there is nothing in the remaining references which can cure the basic deficiencies of Yano et al. and Charlier et al. Specifically, the surface used in Boissel et al. is made of either a cuprous base metal (column 1, lines 47-51) or a metal layer coating said base metal (column 1, lines 43-46 and lines 52-57). The polymer film disclosed in Boissel et al. is deposited on the surface by electropolymerization and under cathodic

Application No. 10/614,516  
Reply to Office Action dated May 13, 2010

polymerization, as indicated at step (a) of the process. See, Boissel et al., at column 2, lines 5-7. Thus, in Boissel et al., the polymer film is deposited and not electrografted.

For all of these reasons, the rejection should be withdrawn

Applicants respectfully submit that the application is in condition for allowance, and early notification of such action is earnestly solicited.

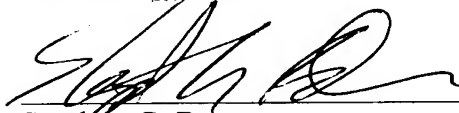
Respectfully submitted,

Customer Number

**22850**

Tel: (703) 413-3000  
Fax: (703) 413 -2220  
(OSMMN 03/06)

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.  
Norman F. Oblon

  
\_\_\_\_\_  
Stephen G. Baxter  
Registration No. 32,884